REMARKS / ARGUMENTS

For the convenience of the Examiner and clarity of purpose, Applicant has reprinted the substance of the Office Action in ***10-point bolded and italicized font.*** Applicant's arguments immediately follow in regular font.

> ***2. Applicant's arguments, see pages 10-11 (sections 1 and 2), filed 12/04/2006, with respect to claims 35-62 have been fully considered and are persuasive. The objection of claims 35-62 has been withdrawn.***

Assignee thanks the Examiner for the favorable treatment of Assignee's arguments and withdrawal of the objections.

> ***4. Claims 35, 40 are objected to because of the following informalities:***
> ***(a) As to claim 35, line 3, delete "A multi-component" and replace it with --a multicomponent--.***
> ***(b) As to claim 40, line 1, delete "fluid comprises" and replace it with --fluid mixture comprises--***
> ***(c) As to claim 41, lines 7-8, delete "an oil or gas well fluid mixture" and replace it with --the fluid mixture-- (for consistency in antecedent basis).***

Assignee has canceled claims 35, 40, 41 without prejudice in favor of the allowability of claims 53 - 70.

> ***(d) Claim 53 recites the limitation "the outlet conduit" in lines 17-18 of the claim. There is insufficient antecedent basis for this limitation in the claim.***
> ***(e) As to claim 53, line 23, delete "of the of the" and replace it with --of the--.***
> ***(f) As to claim 61, line 1, delete "measuring system" and replace it with --system--.***

Assignee has amended claims 53 and 61 to overcome these objections. Reconsideration and withdrawal is requested.

> ***6. Claims 35-70 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.***
>
> ***The term "appreciable time delay" in claims 35, 41, 53 and 63 is a relative term which renders the claim indefinite. The term "appreciable time delay" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention.***
>
> ***Dependent claims 36-40, 42-52, 54-62 and 64-70 are indefinite for the same reason.***

Assignee respectfully traverses this rejection. As a threshold matter, the Office cannot argue that "appreciable time delay," is inherently indefinite as a claims phrase, as this exact phrase appears in the claims of several issued U.S. patents. For example, U.S. Patent No. 4,447,792 uses "***without appreciable time delay***" in claim 1 and yet that claim phrase does not appear in the specification. Similarly, U.S. Patent No. 4,253,255 uses "***no appreciable time delay***" in claim 1 without that claim phrase appearing in the specification. Moreover, the term "appreciable" is not inherently indefinite by itself, as this Technology Center has issued several recent patents with "***appreciable***" as a claim term. *See e.g.,* U.S. Patent No. 6,330,834 ("without appreciable restriction"); 6,009,745 ("appreciable vapor pressure"); 5,533,399 ("free of appreciable restraint"); 5,365,792 ("without attaining appreciable crystallization"); 5,361,631 ("no appreciable erosion"); and 4,987,767 ("does not allow an appreciable amount of air").

As for the use of "appreciable time delay" in the present claims, Assignee submits that those of skill in this art having benefit of this disclosure will have a definite and firm understanding of what the phrase means in the context of the claims. For example, those of skill in the art will readily appreciate that the system and method of claims 53 and 63, respectively, are structured so that the fluid mixture can be delivered to the well at substantially the target density (claim 53) or the desired density (claim 63). Assignee submits that those persons of skill will immediately appreciate that the phrase “without appreciable time delay” means, for example, within a time period such that adjustments to the fluid mixture may be made so that the density of the fluid mixture entering the well is substantially at the target density or the desired density. The specification clearly states that “[i]t is also an object of the invention to provide a densimeter which produces a density measurement with no appreciable time delay, so that any irregularities in the fluid composition can be identified and corrected immediately.” See Application at page 3, lines 7 – 9.

Thus, Assignee submits that the claim phrase “without appreciable time delay” is sufficiently definite and that no amendments are to the claim phrase are required. Reconsideration and withdrawal of this rejection is respectfully requested.

> ***7. Claims 35-40 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.***
>
> ***As to claim 35, it is not clear as to what particular structure enables "the apparatus to be "adapted to verify the composition of the fluid mixture in the densimeter by comparison of the measured density to the desired density". The lack of a particular limitation that provides structural support for the apparatus to perform the function of "comparison of the measured density to the desired density" renders the claim indefinite.***
>
> ***Dependent claims 36-40 are indefinite for the same reason.***

Without acceding to the Office's rejection, Assignee has chosen to cancel claims 35 – 40 without prejudice in favor of the allowability of claims 53 - 70.

> ***8. Claims 41-52 are rejected under 35 U.S.C. 1 12, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.***
>
> ***As to claim 41, it is not clear as to what particular structure enables "the apparatus" to be "adapted to permit adjustment of the mixing ratio based on the measured weight of the fluid mixture". Is the "blending unit" adapted to permit such "adjustment"? If so, how? What particular structural element within the "blending unit" is performing this "adjustment"? The lack of a particular limitation that provides structural support for the apparatus to perform the function of "adjustment of the mixing ratio based on the measured weight of the fluid mixture" renders the claim indefinite.***
>
> ***Dependent claims 41 - 52 are indefinite for the same reason.***

Without acceding to the Office's rejection, Assignee has chosen to cancel claims 41 - 52 without prejudice in favor of the allowability of claims 53 - 70.

> ***10. Claims 35-40 and 53-70 are rejected under 35 U.S.C. 101 because the claimed invention is directed to non-statutory subject matter.***
>
> ***The claims are directed to a judicial exception; as such, pursuant to the Interim Guidelines on Patent Eligible Subject Matter (MPEP 2106), the claims must have either physical transformation and/or a useful, concrete and tangible result. The claims fail to include transformation from one physical state to another. Although the claims appear useful and concrete, there does not appear to be a tangible result claimed. Merely, measuring and comparing would not appear to be sufficient to constitute a tangible result, since the "comparison of the measured density to the desired density" step (claim 35) or the "compare the calculated density with the target fluid mixture density" step (claim 53) or the "comparing the determined density with the desired density" step (claim 63) has not been used in a disclosed practical application nor claimed as made available in such a manner that its usefulness in a disclosed practical application can be realized. As such, the subject matter of the claims is not patent eligible.***

Assignee respectfully traverses this rejection. First, Assignee submits that the Office is mistaken to conclude that any of the claims in this Application are directed solely to an abstract idea, a law of nature or a natural phenomenon. Second, Assignee respectfully points out that while the Office correctly quotes the guidance provided in the MPEP, it does not apply it correctly. Specifically, MPEP 2106 states, in pertinent part (emphasis added to "or"):

> For claims including such excluded subject matter to be eligible for patent protection, the claim must be for a practical application of the abstract idea, law of nature, or natural phenomenon. *Diehr*, 450 U.S. at 187, 209 USPQ at 8 ("application of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection."); *Benson*, 409 U.S. at 71, 175 USPQ at 676 (rejecting formula claim because it "has no substantial practical application").
>
> A claimed invention is directed to a practical application of a 35 U.S.C. 101 judicial exception when it:
>
> (A) "transforms" an article or physical object to a different state or thing; ***or***
>
> (B) otherwise produces a useful, concrete and tangible result, based on the factors discussed below.

There is no requirement in law or in practice that a claim must have both physical transformation ***and*** useful, concrete, tangible result to be eligible subject matter. It is error for the Office to require ***both*** results from the subject claims. While the Office correctly admits that the claims produce a useful and concrete result, the Office questions whether that useful and concrete result is "tangible." To the extent Assignee understands this argument, Applicant would point out that a tangible result of claim 53 is a fluid mixture that is verified to have the target density (i.e., "more closely match the target density thereby verifying the fluid mixture for use in an oil or gas well." Similarly, claim 63 produces a verified fluid mixture; that is, a fluid mixture having substantially the desired density. Thus, claims 53 and 63 each "produces a useful, concrete and tangible result." Applicant respectfully requests reconsideration and withdrawal of this rejection.

> ***12. Claims 35-70 are rejected under 35 U.S.C. 102(b) as being anticipated by Allen (US Patent 5,571,281 henceforth "Allen").***
>
> ***(a) As to claim 35, Allen discloses an apparatus for verifying the composition of a fluid mixture, comprising:***
> ***a multi-component oil or gas well fluid mixed according to a desired ratio of components to produce a desired density (column 1, lines 10-1 5); a pipeline having a bore for the flow of the fluid mixture comprising: an inlet pipelconduit (38) (figure 1; column 4, lines 19-40); an outlet pipe (40) located downstream from the inlet pipe (38) (figure 1; column 4, lines 19-40); a densimeterlconduit (22, 24), having a first end and a second end, wherein the first end is flexibly joined to the inlet pipe (38), and the second end is flexibly joined to the outlet pipe (40) for measuring the density of the fluid mixture flowing through the densimeterlconduit (22, 24) with no appreciable time delay (figure I ; column 4, lines 19-40); and wherein the apparatus is adapted to verify the composition of the fluid mixture in the densimeterlconduit (22, 24) by comparison of the measured density to the desired density (figure 1 ; column 4, lines 40-65).***
>
> ***(b) As to claim 36, Allen clearly discloses that the densimeter (22, 24) extends in a non-vertical direction (figure 1).***
>
> ***(c) As to claim 37, it is clear from figure 1 that the longitudinal axis of the densimeter (22, 24) is substantially straight from the first end of the densimeter (22, 24) to the second end (figure 1).***
>
> ***(d) As to claim 38, it is clear from figure 1 that the cross-sectional area of the densimeter (22, 24) is uniform for the entire length of the densimeter (22, 24) extending from the first end to the second end (figure I).***
>
> ***(e) As to claim 39, Allen discloses a proppant slurryl'lead slurry" that has a density greater than approximately the density of water (column 5, line 58 - column 6, line 3).***
>
> ***(f) As to claim 40, Allen discloses the fluid mixture comprising a cement slurry having a density greater than approximately the density of water (column 1, lines 10-***

Assignee understands this rejection to apply only to claims 35 – 40, and not to claims 35 – 70. With that in mind, and without acceding to the Office's rejection, Assignee has chosen to cancel claims 35 – 40 without prejudice in favor of the allowability of claims 53 - 70.

> ***15. Claims 41-70 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allen as applied to claim 35 above, and further in view of Rondeau et al. (US Patent Application Publication 200210093875 A1 henceforth "Rondeau").***
>
> ***(a) As to claim 41, Allen discloses an apparatus for controlling the density of a fluid mixture being used in an oil or gas well, the apparatus comprising: an inlet pipelconduit (38) having a downstream end (figure 1 ; column 4, lines 19-40); a second pipelconduit (22) having an upstream end and a downstream end, wherein the upstream end of the second pipe (22) is in register with and flexibly connected to the downstream end of the inlet pipe (38), the second pipe (22) having a bore for the flow of the fluid mixture (figure 1; column 4, lines 19-40); an outlet pipe (40) having an upstream end, wherein the upstream end of the outlet pipe (40) is in register with and flexibly connected to the downstream end of the second pipe (22) (figure 1 ; column 4, lines 19-40); and a blending unit (including mixing tank (lo), microprocessor (50)) in communication with the inlet pipe (38) and adapted to mix fluid components according to a known ratio to create the fluid mixture and also adapted to permit adjustment of the mixing ratio based on the measured density of the fluid mixture in the second pipe (40) so that the fluid mixture actually used in the well substantially meets a predetermined fluid density (figure 1 ; column 4, lines 19-65).***
>
> ***As to claim 41, Allen does not expressly disclose a force transducer capable of measuring the weight of the second pipe (40) while the fluid mixture flows there through. However, Allen discloses the microprocessor (50) being preprogrammed based upon the particular cementing job parameters including density and weight. Rondeau discloses a "fluid mixing system" for the continuous mixing of cements or other fluids used in oil or gas wells including a mixing system (1 06), mixing tank (1 14) and a force transducerlload sensor (122) to indicate the weight of the mixing tank (figure 2; paragraphs 001 0, 0020).***
>
> ***It would have been obvious if not inherent, for Allen's apparatus to include a force transducerlload sensor, as suggested by Rondeau, for weight measurements of the second pipe (40) while the fluid mixture flows there through because this would enable the microprocessor (50) to be preprogrammed based upon the weight of the slurry, as required by Allen***

(column 4, lines 51 -58)

(b) As to claim 42, Rondeau discloses the force transducer load sensor (122) being positioned below the mixing tarik (1 1-4) and being capable of supporting the weight of the mixing tank (1 14) (figure 2; paragraphs 0010, 0020). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Allen's apparatus to include Rondeau's force transducerlload sensor, as mentioned above, and further to position the sensor below the second pipe (22) because this would enable the sensor to function properly as suggested by Rondeau.

(c) As to claim 44, both Allen and Rondeau fail to disclose placing load sensor above the second pipelmixing tank. However, it has been held that therewould be no invention in shifting a particular element disclosed by a prior art reference to a different position since the operation of the device would not thereby be modified. In re Japikse, 86 USPQ 70 (CCPA 1950). Note that Examiner's contention of obvious choice in design can be overcome if Applicant establishes unexpected results. Therefore, it would have been obvious to one of ordinary skill in the art at thetime the invention was made to position Rondeau's load sensor above the second pipe (22) as an alternative to placing the sensor below the second pipe (22), because either placement would function equivalently and would be a mere design choice.

(d) As to claims 43 and 45, Rondeau's force transducer (122) is a compression type load cell (figure 2; paragraphs 0010, 0020).

(e) As to claim 46, Allen clearly discloses that the second pipe (22) extends in a nonvertical direction (figure 1).

(f) As to claim 47, it is clear from figure i that the longitudinal axis of the second pipe (22) is substantially straight from the upstream end of the second pipe (22) to the downstream end (figure 1).

(g) As to claim 48, Allen does not expressly disclose the longitudinal axis of the second pipe (22) being curved. However, it is held that when Applicant has presented no argument which convinces us that the particular shape/configuration of their apparatus is significant or is anything more than one of numerous configurations a person of ordinary skill in the art would find obvious for the purpose of providing a pipe for the flow of an oil or gas well fluid mixture. In re Dailey, 149 USPQ 47 (CCPA 1976). See Graham v. John Deere Co., 383 U.S. 1, 148 USPQ 459.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Allen's second pipe (22) in order to make the longitudinal axis of the second pipe (22) curved from the upstream end of the pipe (22) to the downstream end, because this would be a mere design choice.

(h) As to claim 49, it is clear from figure 1 that the cross-sectional area of the

> ***second pipe (22) is uniform for the entire length of the second pipe (22) extending from the upstream end to the downstream end (figure 1).***
>
> ***(i) As to claim 50, Allen does not require the cross-sectional area of the second pipe (22) to be uniform for the entire length of the pipe (22) extending from the upstream end to the downstream end. Therefore, as mentioned in section (g) above, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Allen's second pipe (22) in order to make its cross-sectional area non-uniform, because this would be a mere design choice.***
>
> ***(j) As to claim 51, Allen discloses a proppant slurry/"lead slurry" that has a density greater than approximately the density of water (column 5, line 58 - column 6, line 3).***
>
> ***(k) As to claim 52, Allen discloses the fluid mixture comprising a cement slurry having a density greater than approximately the density of water (column 1, lines 10-15).***

Assignee understands this rejection to apply only to claims 41 – 52, and not to claims 41 – 70. With that in mind, and without acceding to the Office's rejection, Assignee has chosen to cancel claims 41 - 52 without prejudice in favor of the allowability of claims 53 - 70.

> ***16. Claims 53-70 would be allowable if claims 53 and 63 are rewritten or amended to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action.***

Assignee thanks the Examiner for the favorable consideration given claims 53 – 70. Claims 53 – 70 are subject to rejection herein under Section 112, second paragraph, for being directed to non-statutory subject matter. As presented above, Assignee has not amended either of claims 53 or 63 because Assignee contends that claims 53 – 70 are directed to statutory subject matter and the rejection was, therefore, improper. Assignee submits that claims 53 – 70 are in condition for allowance and respectfully requests a timely notice of allowance.

> ***17. As to claim 53, Allen discloses a similar invention as set forth above in the rejection of claims 35 and 41. However, Allen does not expressly disclose a weight measuring device, a first flexible connector or a second flexible connector as defined in claim 53 and in combination with the rest of the limitations in the claim. As to claim 63, Allen does not expressly disclose calibrating a weight measuring unit as defined in claim 63 and in combination with the rest of the limitations in the claim.***
>
> ***Therefore, the prior art neither discloses nor provides the motivation to combine the above-mentioned limitations in claims 53 and 63, in combination with the rest of the limitations in the claims, respectively.***

Assignee agrees with the Office as to what the cited art does not disclose. Assignee also contends that the Office's recitation is not a complete listing of differences between the art and the clams.

Other Claim Amendments

Claim 67 has been amended to correct a typographical error.

CONCLUSION

Claims 1 – 52 have been canceled from this application. Presently, claims 53 – 70 are pending and claims 53 and 61 have been amended.

Assignee thanks the Examiner for the consideration and effort on this matter and submits that this application is now in condition for allowance. Assignee respectfully requests that a timely Notice of Allowance be issued in this case. The undersigned is available to discuss this amendment by telephone or any other matter pertaining to this file

Respectfully submitted,

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